State of California
Department of Fish and Game

Memorandum

Date: 7/9/09

To: Richard Muhl
California Regional Water Quality Control Board
11020 Sun Center Dr., #200
Rancho Cordova, Ca 95670

From: Carol Oz, Staff Environmental Scientist
California Department of Fish and Game-Region 2
1701 Nimbus Road
Rancho Cordova, CA 95670

Carol Oz

Subject: Sediment Pollution in Dry Creek at the East Bay Municipal Utility District Pipeline Project at the Dry Creek Crossing

On or around 4/30/09 I received information from you regarding a turbid water discharge incident in Dry Creek on Elliott Rd. in San Joaquin County. According to the information you provided, an SJ Lewis Construction company employee opened valves at the Dry Creek and Coyote Creek crossings to dewater a pipeline that they were pressure testing in order to repair a leaking valve. This high pressure water release caused significant erosion in the stream bank and considerable sediment discharge into Dry Creek.

On 5/22/09 I met with you at the site to inspect the East Bay Municipal Utility District project area at the Dry Creek and Coyote Creek Crossings. We observed a significant sediment release at the Dry Creek Crossing as a result of the pipe dewatering effort and resulting erosion on the bank of the creek. There was a large sediment deposit in the stream, just below the pipe discharge location. I took photographs with a digital Ricoh camera, and marked the discharge location using a Global Position System (GPS) handheld GPSmap 60CSx device (Photographs and Map attached). I measured the width and depth of the sediment where it entered the stream water. The sediment deposit was approximately 3 ft. deep (see photos attached) and 50 ft. by 45 ft. wide, extending the width of the creek (apprx. 45 ft. shore to shore). There was a large eroded rift in the south bank of the creek, approximately 12 ft. in length extending from near the discharge pipe location to the creek water line. I observed fish downstream of the sediment deposit, as well as insects and birds in this location.

DELETERIOUS EFFECT OF TURBIDITY AND SEDIMENTATION ON AQUATIC LIFE

Turbidity: Turbidity is a condition of water resulting from the presence of suspended particles (Welch, 1952), such as clay, silt, finely divided organic matter, bacteria, plankton, and other microscopic organisms. As an expression of the optical property of water, which causes light to be scattered and absorbed rather than transmitted in straight lines through the sample, turbidity is commonly measured optically with the use of a special light meter. Data is commonly reported in NTUs. It is natural to find silt and sediment in water but problems result when excess amounts are introduced into the water. Excess amounts can harmfully affect water quality, an essential component of fish habitat. Excessive turbidity is deleterious to fish and aquatic resources in several ways. The most obvious effect is that it reduces light penetration into the water and, therefore, reduces photosynthesis by phytoplankton organisms, attached algae, and submersed vegetation which are essential for food chain development and support. Additionally, excessive turbidity may inhibit normal feeding behavior for sight feeders, such as trout and other freshwater species of fish and nanoplankton. Excessive turbidity can cause gill irritation, increase mucous secretion, and respiratory and physiologic distress. Death of fish and aquatic invertebrates exposed to "inert" particulates, which cause increased turbidity, is not usually the result of classic toxic response, but rather the effect of physical abrasion, gill clogging and ultimately suffocation. Natural weathered sediments tend to clog spaces between sensitive gill tissue, while un-weathered mineral solids, coat the actual gill filaments, and thus impede water contact and proper gas exchange, resulting in asphyxiation (Sherk, 1971).

Buck (1956) investigated several farm ponds, hatchery ponds, and reservoirs over a 2-year period in which he measured fish production. He observed that the maximum production of 161.7 lb/acre occurred in farm ponds when the average turbidity was less than 25 NTU; between 25 and 100 NTU fish yield dropped 41.7 percent to 94 lb/acre; and in muddy ponds, where turbidity exceeded 100 NTU, the yield was only 29.3 lb/acre or 18.2 percent of clear ponds.

Exposure to suspended particles can also dislodge insects and algal populations sufficiently to inhibit primary and secondary productivity to the detriment of the stream's carrying capacity (Iwamoto, 1978; Gammon, 1970). While a sand or mud bottom may provide limited habitat for burrowing invertebrates, burrowers are not as available to salmonids as are the preferred forms such as mayflies, caddisflies, and stoneflies that normally inhabit clean, gravel habitat.

Sedimentation: The deposition of sands, silts, or clays, around and on top of streambed rubble, reduces both the area upon which aquatic insects develop, as well as impairing the turbulence required for effective feeding (Phillips, 1971).

Other aquatic species can be equally and adversely affected by the deposition of fine particulates. Salamanders, amphibians, and a host of insect species can become physically entrapped, along with fish fry and incubating eggs, beneath cemented (fine sediments settle into gravel and tend to cement the gravel together) gravels and rocks (Branson and Batch, 1972).

Any barrier to migration and the free movement of the aquatic biota can be harmful. Planktonic organisms and aquatic invertebrates in flowing fresh water are important factors in the re-population of areas and the general economy of the water. Any barrier destroys this valuable source of food and creates unfavorable conditions below or above it (Federal Water Pollution Control Administration, 1968).

RESOURCES AT RISK

Dry Creek is a tributary to the Mokelumne River, which flows to the Sacramento-San Joaquin Delta. The State threatened Swainson's hawk (*Buteo swainsoni)* is documented in the location of this discharge (CNDDB-BIOS, 2009). The creek system in this location and subsequent downstream creeks it flows into would normally contain benthic macroinvertebrates (BMI), which are an important part of the food chain, especially for fish. Many invertebrates feed on algae and bacteria, which are on the lower end of the food chain. Some shred and eat leaves and other organic matter that enters the water. Because of their abundance and position in the aquatic food chain, they are critical in the natural flow of energy and nutrients in the ecosystem.

Downstream habitat includes the Sacramento/San Joaquin Delta. The Delta is an ecologically important area of the State. The Bay-Delta Estuary covers the confluence of the San Joaquin and Sacramento rivers, and Suisun, San Pablo, and San Francisco Bays through which the waters flow to the Pacific Ocean. The Bay-Delta Estuary includes wetlands and sloughs and is inhabited by a variety of fish and wildlife species. Over 200 fish species occur in the Sacramento-San Joaquin River system, the Delta, and the Bay--most of which are marine species. Over 40 fish species commonly occur within the Delta and upstream fresh-water environments. The Bay-Delta area contains some of the most varied natural terrestrial habitats and highest biodiversity anywhere in North America. In addition to biological importance, populations of plant and wildlife species are of great importance to the state's economy with respect to commercial and recreational interests (CALFED EIR/EIS).

Other sensitive species in downstream habitats from Dry Creek include the Giant Garter Snake (*Thamnophis gigas*) (state and federal listed threatened species); Western Pond Turtle (*Clemmys marmorata)* (state special concern species); valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*), a federal listed threatened species; the (State and Federally listed as threatened) Central Valley Spring-Run Chinook salmon (*Oncorhynchus tshawytscha* [sr]); Federally threatened Steelhead (*Oncorhynchus mykiss);* and (State threatened) Central Valley Fall/Late-Fall Salmon (*Oncorhynchus tshawytscha* [fr]). (CALFED, 2000)

CONCLUSIONS

It is my opinion that the discharge of silt and sediment to this stream was deleterious to aquatic life. The force of the water discharge caused significant erosion and turbidity at the time of the release. A large amount of sediment from this discharge incident lodged in the stream, effectively smothering benthic organisms and creating a barrier to natural fish migration. The combined effects of prolonged turbid conditions in the stream at the time of discharge, and subsequent effects of sedimentation caused direct impacts on aquatic macroinvertebrates and fish, such as clogging and abrasion of the gills, reduced ability for sight-feeders to find food, and smothering and/or displacement of macroinvertebrates. Damage to this ecosystem, such as a reduction in available food supply, can have negative impacts to other wildlife higher on the food chain such as fish and the Swainson's hawk.

Corrective action is required to restore natural resources in Dry Creek. A cleanup and restoration plan should be provided to DFG. The restoration plan should include, at a minimum, removing anthropogenic sediment and restoring the stream and stream bank to its prior condition and function. The plan should be developed by a licensed engineer with biological expertise and experience in ecosystem restoration in the state of California. The engineer/consultant should work closely with the DFG to obtain guidance and approval of the plan. DFG shall be advised regarding all scheduled work in and around the pond and stream on the property, and no work shall be implemented at the site until the plan is approved and DFG is notified prior. DFG will conduct post-cleanup and restoration work evaluation.

Attachments: Photographs and Site Map

cc: Kent Smith- DFG
Jaque Kelly-RWQCB
Sue McConnell-RWQCB

References:

Berry, Rubinstein, Melzian and Hill. 2003. The Biological Effects of Suspended and Bedded Sediment (SABS) in Aquatic Systems: A Review (Internal Report). USEPA.

Branson, B.A., and D.L. Batch. 1972. Effects of strip mining on small stream fishes in east-central Kentucky, USA. Proc. Biol. Soc., Washington 84(50):507-517.

Buck, D.H. 1956. Effects of turbidity on fish and fishing. Oklahoma Fisheries Research Laboratory, Report Number 56. Norman, Oklahoma, 62pp.

CALFED Bay-Delta Program. 1999. Technical Reports for the Multi-Species Conservation Strategy. CALFED Bay-Delta Program, Final Programmatic EIS/EIR Technical Appendix. July 2000.

CNDDB. 2009. California Natural Diversity Database. CDFG BIOS webpage.

Cole, Gerald A., Textbook of Limnology, 2nd Edition. 1975. C.V. Mosby Company, 11830 Westline Industrial Drive, St. Louis, Missouri 63141

Federal Water Pollution Control Administration. 1968. Water Quality Criteria, Report of the National Technical Advisory Committee to the Secretary of the Interior. U.S. Government Printing Office, Washington, D.C., 20402

Iwamoto, Robert N., Ernest O. Salo, Mary Ann Madej, R. Lynn McComas. 1978. Sediment and water quality: a review of the literature including a suggested approach for water quality criteria. EPA 910/9-78-048.

Sherk, J.A., Jr. 1971. The effects of suspended and deposited sediments on the estuarine organisms, literature summary and research needs. Nat. Res. Inst., Univ. Maryland, Chesapeake Biol. Lab., Control No. 443, Solomons, Maryland. 73 pp.

Phillips, R.W. 1071. Effects of sediment on the gravel environment and fish production. Pp. 64-74. In: J.T. Drygier and Hall (directors), Proceedings of a symposium. Forest land used and stream environment. October 19-21, 1970. Oregon State University, Corvallis, OR.

Sherk, J.A., Jr. 1971. The effects of suspended and deposited sediments on the estuarine organisms, literature summary and research needs. Nat. Res. Inst., Univ. Maryland, Chesapeake Biol. Lab., Control No. 443, Solomons, Maryland. 73 pp.

Till, B. and Trayler, K. 2000. Sediment in Streams *in* Water Notes. WN17. Water and

Rivers Commission, Western Austrailia.

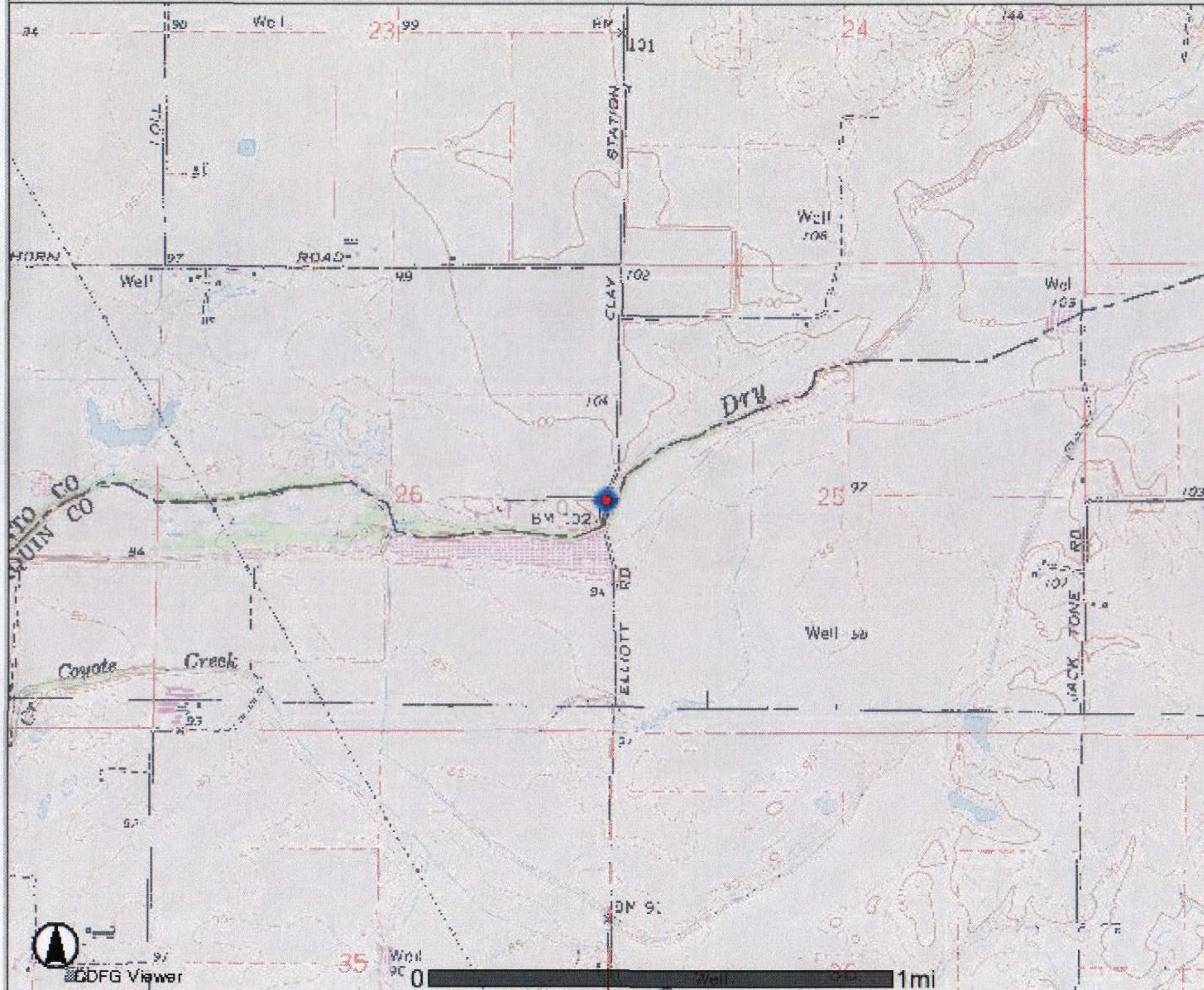
Welch, P.S. 1952. Limnology, Second Edition, McGraw-Hill Book company, Inc. 538pp.

EBMUD Sediment

Dry Creek Coyote C

Author: C.Oz

Date: 7/8/2009 9:48 AM



Map Legend

Western States

Mexico

Photographs Taken of EBMUD Dry Creek Sediment Release on 5/22/09 by C.Oz-DFG

(GPS Coordinate N38.25629 W121.17189)

Photo #1: View of sediment release in Dry Creek looking north, standing on south bank where pipe discharge occurred.

Photo #2: Note probe sunk in sediment. Sediment depth was approximately 3 ft. deep and 40-50 in width and length.

Photo #3: Probe with 3 ft. measurement scale.

Photo #4: View of sediment release looking downstream. Sediment deposit extended across streambed.